CLAIMS

1. Compensator device (PSS), particularly for the stabilisation of electromechanical oscillations, intended to provide a reference signal (OUT_PSS) to a voltage regulator device (AVR) of a synchronous alternator (G) for the delivery of electrical power to a distribution network (NET), said device including:

- first processing means (3,4; 4') for receiving electrical measurement signals representing operative parameters characteristics of said synchronous alternator and/or of said network and for generating an electrical signal to be controlled ($\xi(t)$; ω; P_E) and a first electrical signal ($\sigma(\xi,t)$) corresponding to a sliding surface of the "sliding modes" type,
- second processing means (19, 20) of the first signal ($\sigma(\xi,t)$) for generating the reference signal (OUT_PSS) so that it has a first order "sliding modes" profile and it renders substantially constant the amplitude of the signal to be controlled ($\xi(t)$; ω; P_E), and bringing said first signal ($\sigma(\xi,t)$) substantially to converge to zero.

2. Device (PSS) as claimed in claim 1, wherein the electrical measurement signals include an electrical signal representing an active electrical power (P_E) generated by the alternator (G).

3. Device (PSS) as claimed in claim 2, wherein said measurement signals further include a signal representing

an electrical voltage (v_t) measured at output terminals of said alternator (G), the first processing means being such that the electrical signal to be controlled ($\xi(t)$) is correlated to the ratio between said electrical signal representing the active power and said electrical signal representing the voltage at the output terminals.

4. Device as claimed in any of the previous claims, wherein the electrical measurement signals include an electrical signal representing a rotor velocity (ω) of the alternator (G).

5. Device as claimed in claim 4, wherein said first electrical signal ($\sigma(\xi,t)$) corresponding to said sliding surface is correlated to said rotor velocity (ω).

6. Device as claimed in any of the previous claims, wherein the electrical measurement power include an electrical signal representing a mechanical quantity (P_M; C_M) input to the voltage generator and said first electrical signal is correlated to said mechanical quantity

7. Device as claimed in any of the claims 1 to 3, characterised in that it comprises means (73) for estimating an electrical quantity (P_M; C_M) supplied as input to the voltage generator and in that said first electrical signal ($\sigma(\xi,t)$) is correlated to said mechanical quantity (P_M; C_M).

8. Device as claimed in claim 6, characterised in that said

mechanical quantity is a power (P_M).

9.Device as claimed in claim 6, characterised in that said mechanical quantity is a torque (C_M).

10. Device (PSS) as claimed in at least one of the previous claims, wherein said first processing means (3,4) are such as to perform at least one operation of derivation of the first order of at least one of the electrical measurement signals.

11. Device (PSS) as claimed in claim 10, wherein said first processing means (3,4) are such as to perform a derivation operation of the second order of one of the electrical measurement signals.

12. Device (PSS) as claimed in at least one of the previous claims, wherein said first processing means (3,4) are such as to perform at least one estimate of the derivative of the first order and/or of the second order of at least one of the electrical measurement signal.

13. Device as claimed in at least one of the claims 10 and 11, wherein said first processing means include a second order filter to perform a derivative of the second order of an incoming signal.

14. Device (PSS) as claimed in at least one of the previous claims, wherein first processing means include a linear or non linear observer for the estimation of said second order derivative.

15. Device (PSS) as claimed in at least one of the previous

claims, wherein first processing means include a Levant observer for the evaluation of said second order derivative.

16. Device (PSS) as claimed in claims 10 or 11, wherein said first processing means (3,4) include a device for derivation (4) such as to receive at its input at least the signal to be controlled ($\xi(t)$)) to make available at the output a signal correlated to the first time derivative and/or a signal correlated to the second derivative of the signal to be controlled.

17. Device (PSS) as claimed in claims 12 or 14, wherein said first processing means include an additional device for derivation (4') such as to receive at its input said signal to be controlled ($\xi(t)$)) and another signal indicating the reference voltage requested at the terminals of the alternator (G).

18. Device as claimed in at least one of the previous claims, wherein said second processing means (5-12) are such as to generate the reference signal (OUT_PSS) in such a way that the latter has a profile that is correlated to a sign function (sign σ) of said first signal ($\sigma(\xi,t)$).

19. Device as claimed in claim 18, wherein the second processing means (5-12) are such as to generate the reference signal (OUT_PSS) so that it is correlated to said sign function by means of a variable multiplication factor ($f(\sigma)$) depending on the profile of the absolute value of said first signal ($\sigma(\xi,t)$).

20. Device (PSS) as claimed in claim 3, wherein the first processing means are such that, indicating as $\dot{\hat{\xi}}(t)$ said electrical signal to be controlled, the first electrical signal $\hat{\sigma}(t)$ substantially assumes the following form:

$$\hat{\sigma}(t) = \left(\frac{d}{dt} + \lambda\right) \cdot \dot{\hat{\xi}}(t)$$

21. Device (PSS) as claimed in claim 20, wherein the second processing means are such that, said reference signal, OUT_PSS, substantially assumes the following form:

$$Out\_PSS = H \cdot sign(\xi) \cdot f(\hat{\sigma}) \cdot sign(\hat{\sigma}),$$

in which H is a positive gain factor and $f(\hat{\sigma})$ is a generic function.

22. Device (PSS) as claimed in claim 21, wherein said function $f(\hat{\sigma})$ substantially assumes the following form:

$f=1,\ |\hat{\sigma}(t)|/\Phi>1$; $f = |\hat{\sigma}(t)|,\ |\hat{\sigma}(t)|/\Phi<1$.

23. A regulating system of a synchronous alternator (G) for the delivery of electrical power to a distribution network (NET), comprising a voltage regulator (AVR) and a compensator device (PSS), associated to said voltage regulator (AVR) to provide signals (OUT_PSS) for stabilising electromechanical swings, characterised in that said compensator device (PSS) is as claimed in any of the claims 1 through 21.

24. A regulating system as claimed in claim 22, wherein said compensator device (PSS) is obtained as a modular element (15) able to be selectively coupled to and removable from said voltage regulator (AVR).